MISCELLANEOUS.

The Embryonic Development of Comatula (Antedon rosacea). By Oswald Seeliger, of Berlin.

In the following paragraphs I communicate some of the results of a detailed investigation the account of which will be published in Spengel's 'Zoologische Jahrbücher,' but cannot appear forthwith on account of the large number of plates.

Segmentation is unequal. The segmentation cavity appears at the stage with four blastomeres of equal size. The third and equatorial furrow differentiates four smaller cells, which are situated at the animal pole, and four larger vegetative ones. The smaller blastomeres next divide, and then the larger cells; the stage with sixteen cells is therefore preceded by one with twelve. Upon this there next appears round the animal pole a furrow running parallel to the equator, whereby sixteen equal-sized animal cells are formed, so that a stage with twenty-four cells is reached. In consequence of a mutual displacement of the small cells the segmentation cavity closes up at the animal pole, while the eight large cells become divided by an equatorial furrow into eight smaller and eight larger cells, situated at the vegetative pole. It is not until the stage at which forty-eight cells are present that the closure of the segmentation cavity at the vegetative pole ensues and a typical blastula is formed, the cells of which proceed to divide in such a way that sixty-four, ninety-six, and one hundred and twenty-eight cells are differentiated.

In abnormal cases the equatorial furrow is not the third but the first to appear, and segmentation commences with the formation of two cells of unequal size. The smaller cell then divides, so that the stage with two cells is followed by one with three. By the extension of the second and meridional furrow to the larger cell four blastomeres arise—two larger and two smaller ones. After each of these has divided by a second meridional furrow into two cells of equal size a stage with eight cells is produced, which then entirely corresponds to the normal development.

The gastrula arises by invagination at the vegetative pole in such a manner that the chief axis of the ovum precisely coincides with that of the embryo and of the subsequent larva. The mesenchyma arises from the endoderm.

It appears to me to be worth while mentioning an abnormal bigastric form of embryo, of which I found one example among normally developed blastulæ. In the elliptical germ two gastrula invaginations had developed and a number of mesenchyma cells had appeared at their blind ends. This latter circumstance excludes the suspicion that what was seen might possibly have been accidental incurvations of the blastula wall, which would afterwards be evaginated again: as is well known, this was the explanation given by Metschnikoff of Fol's polygastral embryonic forms of Echinoderms.

As regards the further development I shall confine myself here to treating of the nervous system. The free-swimming larva possesses a nervous system of its own which is of merely provisional importance and which already begins to develop in the latter part of the embryonic period. At the anterior pole, which is distinguished by the tuft of cilia, a delicate system of fibres was observed by Bury, who conjectures that it is possibly nervous. The apparatus proves to be of a highly complicated character. The cells of this region, which we may term the apical pit, consist of sense-cells and undifferentiated supporting-cells. Both kinds of elements are rod-shaped, and their nuclei lie at somewhat variable altitudes near the inner ends. These latter appear to be blunt in the case of the supporting-cells, but in the sense-cells, on the contrary, are drawn out into a fine process which penetrates into the layer of the nerve-fibres. The nerve-fibre layer is of considerable thickness at the apex, but diminishes very rapidly towards the periphery; it is only on the ventral surface that a powerfully developed cord of fibres extends on each side of the vestibular invagination far into the posterior section of the body. Under the apical pit the layer of fibres is bounded towards the primary body-cavity and the mesenchyma cells by a basement membrane, which appears at a very early stage in the embryonic development. Even before the cells of the apical pit had attained their definite histological character, as supporting and sense-cells, numerous ectoderm cells separated from their connexion with the epithelium and wandered into the depths, to become transformed into ganglion cells, which lie above and between the layer of fibres. Isolated ganglion cells are also embedded in the two ventral longitudinal nerve-trunks.

Soon after the attachment of the larva the entire nervous system disappears, and it is not until much later, some two to three weeks after the attachment takes place, that there appears at the oral disk —which proceeds from the vestibular invagination—an extremely delicate nerve-ring, which is identical with the apparatus described by Ludwig as the sole nerve-centre of the adult form. It is of exclusively ectodermal origin, and beside the fibres scattered ganglion cells can be distinguished. I have not been able to follow up the origin of the second and third nervous systems of the adult, which were discovered by Carpenter and Jickeli, since in the oldest of the larvæ examined by me the rudiments of them were not yet visible.—*Zoologischer Anzeiger*, xv. Jahrg., no. 404 (Oct. 31, 1892), pp. 391–393.

On Deglutition in the Synascidiæ. By S. Jourdain.

The mechanism of deglutition in the Composite Ascidians, by which I mean the Ascidiæ Sociales of H. Milne-Edwards, is still imperfectly understood.

Several naturalists, applying to these animals what Hermann Fol found to be the case in *Doliolum*, have supposed that the nutritive particles follow the groove of the endostyle. This groove secretes a cylinder of mucus which agglutinates these particles and which, in consequence of the action of the vibratile cilia with which the groove is lined, descends towards and enters the stomach.